1999–2000 CATS ASSESSMENT
Open-Response Item Scoring Worksheet

Grade 5 – Mathematics

The **academic expectations** addressed by the open-response item "Number Cubes" are:

1.5-1.9 Students use mathematical ideas and procedures to communicate, reason, and solve problems.

2.7 Students understand number concepts and use numbers appropriately and accurately.

The **core content** addressed by this item includes:

MA-E-1.1.3 Number/Computation (Concepts): Students understand odd and even numbers, composite and prime numbers, multiples, and factors.

MA-E-1.2.7 Number/Computation (Skills): Students use factors to determine prime and composite numbers.

Number Cube

José created a game using two number cubes of different colors. The green cube had ODD multiples of 3 and the red cube had EVEN multiples of 3.

a. What was the color of the cube that had the number 6?

b. List SIX numbers that could be on the OTHER cube.

c. Could José design the same game using multiples of 4? Explain your answer.

Score	Description
4	Parts (a) and (b) are correct. Student correctly answers part (c), and the explanation given is clear and correct.
3	Parts (a) and (b) are correct. Student correctly answers part (c) and gives a vague explanation.
2	Two of the three parts are correct. Explanation is incorrect or missing. OR Part a is correct. Student's answer to part b is partially correct (i.e., correctly listing 3 to 5 odd multiples of 3). A vague or incomplete explanation is given in part c.
1	Response shows minimal understanding of even/odd numbers (e.g., one of three parts is correct).
0	Response is totally incorrect or irrelevant.
Blank	No response.

Answers:

Part a: red cube

Part b: answers might include 3, 9, 15, 21, 27, 33, etc., (any ODD multiple of 3)

Part c: response is NO and explanation expresses fact that any multiple of 4 is EVEN

ANNOTATED STUDENT RESPONSE
Grade 5 Mathematics

Sample Student Response Scored a 4

Student Response

a. The color of cube six would be red.

b. 3, 9, 15, 21, 27, 33.

c. No Jose can't play this game with 4 because multiples of 4 have no odd numbers for the green cube.

← Student correctly answers that the color of the cube would be "red."

← Student correctly gives six odd multiples of 3.

← Student correctly answers "No" and the explanation given is clear and correct.

Overall, the student demonstrates a strong understanding of odd and even numbers and multiples of numbers. The student correctly answers all three parts of the item and correctly explains the process used to arrive at the answer in part c.

ANNOTATED STUDENT RESPONSE
Grade 5 Mathematics

Sample Student Response Scored a 4

Student Response

I will answer the questions I will be asked during the open response question.

a. Red

b. 33, 3, 27, 9, 15 and 21

c. No because 4 has no multiples that are odd.

I have answered the questions I have been asked during the open response question.

← Student correctly answers that the color of the cube would be "Red."

← Student correctly gives six odd multiples of 3.

← Student correctly answers "No" and the explanation given is clear and correct.

Overall, the student demonstrates a strong understanding of odd and even numbers and multiples of numbers. The student correctly answers all three parts of the item and correctly explains the process used to arrive at the answer in part c.

ANNOTATED STUDENT RESPONSE
Grade 5 Mathematics

Sample Student Response Scored a 3

Student Response

A. The color of the cube was red.

B. The 6 numbers that could be on the other block is 3, 9, 15, 21, 27, and 33.

C. No. Because multiples of 4 have different Products.

Student correctly answers that the color of the cube would be "red."

Student correctly gives six odd multiples of 3.

Student correctly answers "No," but the explanation is vague and incomplete.

Overall, the student demonstrates a general understanding of odd and even numbers and multiples of numbers. The student correctly answers three parts of the item but gives a vague explanation for part c.

ANNOTATED STUDENT RESPONSE
Grade 5 Mathematics

Sample Student Response Scored a 2

Student Response

A. red

B. 9, 3, 15, 21, 18, 27

C. No, because his numbers are odd on the green cube, and they cant be the same numbers.

← Student correctly answers that the color of the cube would be "red."

← Student attempts to give six odd multiples of 3 but only five of the numbers are odd numbers.

← Student correctly answers "No," but the explanation is vague and incomplete.

Overall, the student demonstrates some understanding of odd and even numbers and multiples of numbers. The student correctly answers part a and some of part b and part c.

ANNOTATED STUDENT RESPONSE
Grade 5 Mathematics

Sample Student Response Scored a 1

Student Response

a. The color of the cude is Red bcause it i Even.

b. 9, 13, 17, 21, 25, 29

c. Jose bisen could had been. The reoson is decause his disen looke just like the other disen.

← Student correctly answers that the color of the cube would be "Red."

← Student attempts to give six odd multiples of 3 but only two of the numbers are correct.

← Student attempts to answer part c but the answer and the explanation are unclear.

Overall, the student demonstrates a minimal understanding of odd and even numbers and multiples of numbers by correctly answering part a and some of part b.

INSTRUCTIONAL STRATEGIES
Grade 5 Mathematics

The open-response item "**Number Cubes**" was designed to address students' understanding of odd and even numbers and multiples. The instructional strategies below present ideas for helping students explore and master these concepts.

Use objects such as toothpicks, buttons, and color tiles to review that an even number of objects can be divided into two equal groups and that when an odd number of objects is divided into two groups, one is left over.

Show patterns of multiples through color-coding on a hundreds chart or on a calendar.

Provide opportunities for students to work individually, in pairs, in small groups, and/or as a class to complete (with teacher guidance and support) any or all of the following activities:

- Count by 2s, 3s, 4s, or nickels, dimes, quarters, and so on to describe multiples.
- Color in multiples on a hundreds chart, calendar, or other number list.
- Look for a pattern within multiples (e.g., are all the multiples of 6 also multiples of 3?).
- Discuss whether there are multiples of 0 and 1.
- Determine whether numbers are even or odd by dividing the number of objects into two piles evenly or dividing the number by 2 to see if there is a remainder.
- Explore patterns in even and odd numbers.
- Look up large numbers in the news and determine if they are even or odd.
- Reason through questions like: What do you have to do to an odd number to get an even number? If you have an even number, how can you get the next even number? What kind of number do you get when you add two even numbers? What kind of number do you get when you add two odd numbers? What kind of number do you get when you add an odd and an even number? Can you ever multiply an even number by a number and get an odd number? Why?
- Discriminate between odd numbers and odd multiples and between even numbers and even multiples.
- Color in the odd multiples of a number on a hundreds chart and discuss the pattern; with a different shade, color in the even multiples of the SAME number on the SAME hundreds chart and discuss the pattern; then discover how the patterns are the same and how they are different.